Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

UPDATED STATEMENT OF PAUL F. WALKER, PH.D.

Klein Walker Associates, Inc.
68 Holworthy Street
Cambridge, Massachusetts 02138

14 November 1983

Mr. M.J. Sires, III
Assistant Manager for Health, Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, SC 29801

Dear Mr. Sires:

FC-2 Please change my 11 November 1983 letter to you regarding the L-Reactor draft EIS as follows:

> Strike the last sentence on page 2, "President Reagan has...," and insert: "President Reagan has proposed reducing deployment of Pershing II's and GLCM's in Europe to 420 or less, some 150 less than presently predicted."

Comment noted.

Thank you.

Sincerely,

Paul F. Walker, Ph.D.
President

PFW/fl

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATEMENT OF GARY H. WHITAKER, ROBERT H. WHITAKER, AND DOROTHY J. WHITAKER Gary H. Whitaker 214 Pine Lane Cayce, SC 29033 U.S. Department of Energy Post Office Box A Aiken, S.C. 29801 To whom it may concern:	
FD-1	As a citizen of S.C. I must protest the start up of the L-Reactor, since it threatens our environment. I feel we must demand that DOE facilities be required to comply with federal and state environmental standards applicable to commercial reactor sites; and steps be taken to avoid damage to the environment before startup, regardless of cost. Sincerely, Gary H. Whitaker Robert H. Whitaker Dorothy J. Whitaker	See the responses to comments AA-3 and AF-2 regarding DOE's commitment to comply with applicable Federal and state regulations and to take all reasonable steps to mitigate impacts, and the response to comment BF-7 regarding the differences between SRP reactors and commercial light-water reactors.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF PIXIE A.B. NEWMAN

Hydraulics Division
Civil and Environmental
Engineering Department
1269 Engineering Building
1415 Johnson Drive
University of Wisconsin
Madison, Wisconsin 53706
November 10, 1983

Mr. M. J. Sires, III
Assistant Manager for Health,
Safety and Environment
U.S. Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29801

Dear M. J. Sires:

The enclosed statement is a review of hydrogeologic sections of the Draft Environmental Impact Statement: L-Reactor Operation, Savannah River Plant, Aiken, S.C., V.I and V.II, September 1983 conducted for the Energy Research Foundation, Columbus, S.C. This review is based on the Draft EIS, supplementary references provided to me by the Energy Research Foundation, and on my knowledge of hydrogeology. The review was prepared in consultation with John S. Brasino, a fellow graduate student in hydraulics, and John A. Hoopes, Professor of Civil and Environmental Engineering, at University of Wisconsin-Madison.

I am a graduate student in the Hydraulics Division of the Civil and Environmental Engineering Department at the University of Wisconsin-Madison. I have a B.A. in geology from Carleton College in Minnesota, a M.S. in Water Resources Management from the University of Wisconsin-Madison, and a M.S. in Civil and Environmental Engineering from the University of Wisconsin-Madison. In addition, I am an applicant for Engineer-in-Training in the State of Wisconsin and a member of the

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	American Society of Civil Engineers and the American Geophysical Union. I trust these comments will be considered by DOE in preparing the final EIS. Sincerely, Pixie A.B. Newman	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

REVIEW OF THE HYDROGEOLOGY SECTIONS
OF THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
L-REACTOR OPERATION,
SAVANNAH RIVER PLANT, S.C.

Prepared by
Pixie A.B. Newman

For the Energy Research
Foundation

November 10, 1983

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FE-1	A primary objective of an environmental impact statement is to assess and clearly state the environmental impacts associated directly and indirectly with the proposed project or activity. The sections of the Draft EIS: L-Reactor Operation, Savannah River Plant, Aiken, S.C. devoted to the effects of proposed L-Reactor startup on groundwater resources falls short of this objective. It does not quantify the anticipated effects of the L-Reactor startup on groundwater flow and groundwater quality conditions at the Savannah River Plant (SRP). Although the report recognizes that increased pumpage due to proposed L-Reactor startup will affect the vertical piezometric head relationships between primary on-site aquifers (see p 5-9 and 5-12) and specifies in Table 5-6 (p 5-10 and 5-11) the additional drawdown under seepage basins caused by this pumpage, it does not provide a complete interpretation of the impacts associated with these changes in vertical head relationships on groundwater and surface water flow rates and quality. In addition, I have three major criticisms: 1) current hydrogeologic relationships and groundwater flow rates are not fully presented; 2) original data are not presented in a meaningful and easily digestible manner; and 3) past modeling efforts appear to be inadequate and poorly documented. *The following comments are made in relation to criticisms 1)* and 2). Although the pre-SRP hydrogeology and hydrogeochemistry of the area was studied and characterized by Siple (1967) using data collected in the 1950s and early 1960s, recent water use and waste management practices have altered the vertical hydrogeologic gradients and groundwater quality in the aquifers at the SRP site. (This is evidenced by Figure 3-11, which shows the piezometric head declines due to increased SRP pumpage, and by the existence of contaminant plumes beneath SRP seepage basins at the M-Area (see Figures F.32 and F.33) and possibly elsewhere.) The magnitude of these effects and future impacts due to the L-Reactor startup cannot be assessed without sufficient, up-to-date, site-specific data. The following information must be included in the EIS:	Section 5.1.1.4 presents a tabulation of the geohydrologic effects, particularly the changes in vertical head relationships, caused by L-Reactor startup, and provides an assessment of the impacts associated with these changes in the quality of ground water. The changes will have very little effect on surface-water flow rates and quality (also see the response to comment DA-8). The central theme of the subsurface hydrology discussions in Section 5 and Appendix F is to provide the current hydrologic relationships and ground-water flow rates. These are fairly well understood throughout SRP. Apparently the comment stems from the belief that the hydrologic system is rapidly changing. This is not the case. Much of the original data is provided in the references given in Appendix F. Further modeling efforts are in progress but it is not anticipated the results will affect the conclusions of the EIS. The need for sophisticated ground-water models for assessing the effects of L-Reactor operation is discussed in the responses to *comments EN-47 and EN-49.*

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FE-2	1) large scale (e.g., an overall scale of 1:48,000 and subarea scale of at least 1:6000) plan with view maps showing: a) the current (1982-1983) piezometric surfaces of each major aquifer present at SRP and surrounding area; b) the locations of data points used to generate these surfaces and the date of water measurement collection; c) the recharge and discharge areas of each aquifer; d) the locations of existing and planned pumping wells and associated cones of depression; e) the locations of active and inactive seepage basins, pits, and landfills; f) the areal extent of contaminant plumes as they presently exist; g) lines showing the locations of cross-section maps provided;	A detailed discussion of the subsurface hydrology at SRP, which is summarized in Section 3.4.2, is provided in Appendix F. Table F-1 of Appendix F has been revised to provide a detailed summary of the characteristics of the hydrogeologic units at SRP. Water table levels and piezometric surfaces for the major aquifers (Congaree and Tuscaloosa) are shown. Water level contour maps and cross sections of shallow aquifers in the vicinity of those waste facilities which will be impacted by L-Reactor startup are also shown. The locations of these facilities are identified on the maps and cross sections provided in the EIS. Additional sitewide information on the waste disposal sites (including active and inactive seepage basins) at SRP is presented in Du Pont (1983; DPST-83-829). This reference contains exact locations of all waste disposal sites, areal extent of contaminant plumes as they have been defined to date, and cross-section maps. A subsequent NEPA review will address the SRP "Ground-Water Protection Implementation Plan," which is currently under review by the State of South Carolina and the U.S. Environmental Protection Agency--Region IV.
FE-3	2) cross-section maps (along and orthogonal to the predominant horizontal flow direction) showing: a) vertical head gradients within and between each aquifer (indicating the name and location of wells used, their screen lengths, and the date of data collection); b) hydraulic head relationships beneath each seepage basin or pit which could be affected by L-Reactor startup (pumpage effects and/or loading effects); c) present and predicted contaminant plume development and migration due to additional pumpage and/or additional loadings to support L-Reactor startup;	Hydraulic relationships for the geologic formations beneath SRP are given in Appendix F. Sufficient information is presented to determine the magnitude of any direct and incremental impacts on those waste facilities affected by resumption of L-Reactor operation.
FE-4	3) mass balance analysis, with estimates of the amount and distribution of recharge to and discharge from the groundwater system (e.g., recharge from rainfall, seepage basins and leakage through confining clay layers and discharge to streams, swamps, pumping wells and leakage through confining layers), based on measured hydraulic conductivities and gradients in confining layers as well as aquifers;	A detailed water budget for all aquifer systems underlying SRP is not considered essential in the evaluation of L-Reactor operation. Sufficient information on rainfall recharge, seepage basin flow paths and travel times, discharges to onsite streams, and ground-water pumpage is presented in the EIS to determine the magnitude of any direct and incremental ground-water impacts resulting from the operation of L-Reactor. An independent NEPA review will address the SRP "Ground-Water Protection Implementation Plan."

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FE-5	4) contaminant mass balance analysis based on mass loadings to seepage basins and contaminant concentrations measured beneath and downgradient of seepage basins.	The seepage basins in L-, F-, H-, and M-Areas will be impacted by L-Reactor operation. The spatial extent of ground-water contamination in the vicinity of these basins is discussed in the EIS. Mass balances are not included because of uncertainties in actual quantities of materials released to the basins in early years of operation. However, the key factors are what species and concentrations have reached the shallow aquifer systems. These data are presented from water quality analyses that have been made (Section F.5).
FE-6	The Draft EIS contains general statements regarding flow directions, general recharge and discharge areas, and relative permeabilities but the specific, support data are often lacking, particularly when representing the hydrogeology of clays. The Draft concludes that "[o]nly in the M-Area where downward flow paths are known to exist[is there significant potential for water table discharges to reach the major regional aquifer (the Tuscaloosa)" (p 3-32). The underlying premise is that vertical recharge into the Tuscaloosa does not and will not occur in the L or other L support areas and that on-site contamination of shallow aquifers does not constitute a significant environmental impact. The omission of a thorough assessment of these impacts is contrary to the philosophy and purpose of an EIS. The characterization of shallow aquifer contamination must be expanded.	The fact that there is interest in protection of the regional aquifer (Tuscaloosa) should not be interpreted to mean that the shallower sediments are neglected. The EIS provides an extensive discussion of potential impacts to the shallow ground waters beneath the SRP from the operation of L-Reactor. An assessment of impacts to surface-water quality and dose commitments for liquid releases following a shallow ground-water to surface-water path are presented in the EIS (Sections 4.1.2.3, 5.1.1.2, and 5.1.2).
FE-7	As presently written, the Draft EIS contains some contradictory data and/or figures and leads the reader to believe that the quality of the Tuscaloosa aquifer (outside the M-Area) is protected from contamination due to the "extensive upward vertical gradient between the Tuscaloosa and the Congaree hydrostratigraphic units and the impermeability of the green and pisolitic clays. In addition, the report claims that the Tuscaloosa and Congaree aquifers discharge into the Savannah River and that this discharge prevents potentially contaminated waters, originating on-site, from causing off-site contamination of the Tuscaloosa aquifer in Georgia. This statement seems to ignore the off-site effects of discharges into and transport downstream in the Savannah River.	Although seepage basins have been in service at SRP since the Mid-1950s, drinking water from the Tuscaloosa wells in the central portion of SRP has never been found to be contaminated by radionuclides or by chlorinated hydrocarbons. Thus, the combination of hydrostratigraphic characteristics and upward head differential in this area of the SRP are effective in protecting the Tuscaloosa Aquifer. As discussed in response to comment EN-24, the basal clay of the Congaree and upper clay of the Ellenton form an effective confining unit throughout the SRP for the sands in the underlying Tuscaloosa Aquifer. Most recent testing of A- and M-Area wells suggests that chlorinated hydrocarbons in the contaminated Tertiary sediments have migrated into the annulus of wells producing from the Tuscaloosa and that the contamination reported earlier was not from generalized contamination of the Tuscaloosa. The contaminated production wells have been shut down.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		The depression in ground-water head due to discharge in the Savannah River valley prevents ground water from moving from South Carolina to Georgia through a ground-water pathway. It is well recognized that the Savannah River is a ground-water sink (Sections F.2.3 and F.4).
FE-8	Data presented in Figure 3-8 show that upward vertical gradients are, at least locally, being significantly reduced due to present pumping practices. Pumpage in the H-Area has reduced the vertical head difference between the Tuscaloosa and the Congaree to less than or equal to 0.6 m (2.0 ft). Figure 3-9 (p 3-29), which is supposed to show the 1982 vertical head difference between the Tuscaloosa and the Congaree, misrepresents the magnitude of this difference at the H-Area.	It is true that the head in the wells in Figure 3-8 of the draft EIS shows a 0.6 m head difference but these wells are within the line of depression of the H-Area production wells. Figure 3-9 opf the draft EIS shows the regional pattern of head relationships without including the details of the several areas of depression which are generally small in area. This is why Figure 3-9 was constructed by subtracting the contours in Figure F-18 from those in Figure F-9.
FE-9	Insufficient data limit the reader's ability to assess the accuracy of this figure in other areas at the SRP. Figure 3-9 (also Figure F-29) was not generated from data collected at nested observation wells which measure piezometric head at 2 or more depths within each hydrostratigraphic unit; instead, it was generated by subtracting one interpolated piezometric surface (Figure F-18) from another (Figure F-9). The credibility of this figure is further weakened by the fact that data used to generate the 2 original piezometric surface maps were "somewhat sparse" (p F-71). Nevertheless, this figure is included in the Draft EIS anyway, thus perpetuating the possible misconception that the Tuscaloosa groundwater is protected. In the text, the figure is improperly used to assess the actual vertical head difference between the Congaree and the Tuscaloosa. Clearly, the magnitude and the horizontal domain overwhich the upward vertical gradient exists and will continue to exist after L-Reactor startup needs to be better documented. Similarly, the protective powers provided by "impermeable" green and pisolitic clays, which do not impede downward flow in the M-Area (see Figure F-11) and are proported to impede flow elsewhere, need to be quantified. Furthermore, the hydraulic conductivity of these clay layers may be reduced by organic solvents and other seepage chemicals and these effects need to be examined.	As mentioned in the response to comment FE-8, Figure 3-9 was constructed to portray the regional nature of the head relationships. Clusters of piezometers do not exist on a regional basis although wells have been drilled in certain operating areas for special studies. Additional monitoring wells to provide broader regional coverage are planned. The data for Figures F-18 and F-9 of the draft EIS are sparse but they have been separated on an aquifer basis in order to provide a better understanding of geohydrology than previous authors. As an example, it is better to have fewer data points for the Tuscaloosa than to mix heads from the shallower Tuscaloosa with those from the deeper Tuscaloosa Aquifer. Thus, it is believed that these maps more accurately depict the head in these aquifers than previous maps. These maps are included because they represent the most advanced understanding of the hydrogeologic system and not to "perpetrate a possible misconception." Protection of the Tuscaloosa Aquifer is discussed in the response to comment FE-7.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FE-10	The hydrogeologic data collected to generate the areal and cross-section maps should provide enough information upon which modeling efforts may be based (criticism 3). At the very least, a mass balance relating inflows, outflows, and aquifer storage should be developed for each aquifer. Past modeling efforts referred to in the EIS were limited in scope, focusing solely on a 2-dimensional representation of the Tuscaloosa aquifer. As could be discerned from available documentation (Marine and Routt, 1975), little effort was made to determine the seepage or leakage between the Congaree and the lower Ellenton and Tuscaloosa aquifers. Groundwater flow at the SRP occurs within and between multiple hydrostratigraphic units. Piezometric head relationships change both horizontally and vertically. Hence, models of this area's hydrogeology must attempt to accurately represent the entire 3-dimensional system.	A detailed discussion of the hydrogeologic properties of the subsurface units at SRP is provided in Appendix F; this information is summarized in Section 3.4.2. For the previous modeling of the Tuscaloosa a two-dimensional model was adequate for the desired objectives. It has been recognized since 1975 that to model the entire geohydrologic system, a three-dimensional model is required. SRP began to develop a code for that purpose in 1975. However, the USGS made available a three-dimensional code in 1973 which has been used for specific modeling in operating areas. Two-dimensional modeling of the relation between Tuscaloosa water levels and ground-water withdrawal has been performed; this is described in this final EIS in Section F.4.2 and in the appropriate section of Volume I. A regional model of the entire geohydrologic system at SRP has been initiated. The need for sophisticated ground-water models for assessing the effects of L-Reactor operation is discussed in the responses to comments EN-47 and EN-49.
FE-11	Given sufficient hydrogeologic data, predictions of groundwater flow conditions and contaminant transport impacts can be assessed under the new environmental stresses associated with the L-Reactor startup. In addition to the information previously noted, an adequate environmental impact statement must include: 1) a comparison of flow rates beneath seepage basins before and after additional L-Reactor support pumpage; 2) contaminant plume development and migration before and after L-Reactor support loadings; and 3) groundwater contaminant discharge rates to creeks and the Savannah River before and after L-Reactor startup.	A discussion of the hydrologic characteristics of the different water-bearing formations are discussed in Section 3.4.2 and Appendix F. Additional information on the current knowledge of the areal extent and characteristics of the known contaminant plumes are discussed in Du Pont, 1983; DPST-83-829. The impact on the known source areas in L-, F-, H-, and M-Areas and in the burial grounds are discussed in Sections 4.1.1.3, 4.1.2, 5.1.1.2, 5.1.1.4, and 5.1.2.1. Ground-water travel times from seepage basins to on-site streams are discussed in the response to comment EN-44.
FE-12	From the little data presented in the Draft EIS, it appears as though continued and increased loadings from the L-Reactor startup will contribute to the development and migration of the contaminant plumes below several of the active seepage basins. Conceivably, effects of additional L-Reactor pumpage may induce flow and spread contamination away from inactive as well as active waste sites. There is little doubt that L-Reactor startup will accelerate contamination problems in the F- and	As discussed in Sections 4.1 and 5.1, impacts to the different aquifer systems beneath L-, F-, H-, and M-Area seepage basins due to L-Reactor operation are expected to be small. This assessment is based on the existing physical models provided by the F- and H-Area basins, and SRP burial ground plumes and extensive studies of the movement of radioactive materials in the ground water and their contribution to onsite streams. Section 5.1 has been expanded to include a more thorough discussion of

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	H-Areas (nitrates and mercury) and in the M-Area (degreaser solvents - tetrachloroethylene, trichloroethylene, and 1,1,1-trichloroethane).	the chlorinated hydrocarbon contamination in M-Area, the protection of public health and active program for the clean-up of this contamination. This topic is also discussed in the response to comment FE-13, below. Also see the response to comment FE-1.
FE-13	Groundwater contamination by chlorocarbons in the vicinity of the sewer line and the seepage basin in the M-Area is very serious and efforts are being made to cleanup and contain this contamination. Since the efficiency of M-Area cleanup activities has yet to be demonstrated, it remains to be seen whether further contamination associated with L-Reactor startup will cause more extensive post-cleanup groundwater contamination. However, by all accounts, the additional L-Reactor loadings will increase short-term and may potentially increase long-term groundwater contamination at the M-Area.	The L-Reactor incremental discharge to the M-Area settling basin is expected to be at most 0.12 cubic meter per minute; thus additional ground-water impacts from incremental M-Area operations in support of L-Reactor will be minor. The groundwater contamination currently found in the vicinity of M-Area is confined to the Tertiary age formations which are not very transmissive due to the interbedded and intercolated nature of the sediments. Horizontal flow velocities are slow, on the order of 7.6 meters per year. None of the contaminants have migrated off the plant site and no immediate offsite hazard exists. The vertical gradients from the Tertiary formations to the Tuscaloosa Aquifer are downward in the M-Area vicinity. Additional withdrawals from the Tuscaloosa as a result of L-Reactor would increase this gradient only slightly. Current plans call for discontinuing the use of M-Area seepage basin by April 1985 and constructing a process wastewater treatment facility (Section 5.1.1.2). Remedial action to remove the ground water which contains hydrocarbons from beneath M-Area has begun and will reduce the potential for further contamination of the aquifer systems in the area. Also see the response to comment DA-4.
	In summary, the Draft EIS representation of present hydrogeologic conditions and groundwater environmental impacts associated with L-Reactor startup is inadequate. The potential for significant groundwater contamination due to L-Reactor startup exists. An assessment of the seriousness of these impacts cannot be determined from the data provided in the Draft EIS document. The EIS must include the results of studies to: 1) develop a sound basis of comparison for impact assessment, -- fully characterize present groundwater flow relationships and quantify flow rates (see listing on page 2 for information required), take out all old and possibly misleading data, comment on seasonal effects and on the existence of the Millet fault	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	and its effect on groundwater discharge rates; -- fully characterize the extent of present groundwater contamination in shallow as well as deep aquifers (see listing on page 2); 2) conduct mass balance analysis for waters in each aquifer and for each contaminant plume identified; 3) make predictions of environmental impacts of L-Reactor startup on groundwater flow rates and quality, base predictions on mass base calculations, supplement these with 3-D model predictions if possible.	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

References:

1) Faye, R.E., and D.C. Prowell, 1982. "Effects of Late Cretaceous and Cenozoic Faulting on the Hydrology of the Coastal Plain near the Savannah River, Georgia and South Carolina," U.S.G.S. Open-File Report 82-156, U.S.G.S., Doraville, Georgia, 80p.

2) Marine, I.W. and K.R. Routt, 1975. "A Groundwater Model of the Tuscaloosa Aquifer at the Savannah River Plant," Savannah River Laboratory Environmental Transport and Effects Research Annual Report-1974, DuPont, Savannah River Laboratory, Aiken, S.C., 10p.

3) Siple, G.E., 1967. "Geology and Ground Water of the Savannah River Plant and Vicinity, South Carolina," U.S.G.S. Water-Supply Paper 1841, U.S. Government Printing Office, Washington, D.C., 113p plus plates.

4) U.S. Department of Energy, 1983. Draft Environmental Impact Statement: L-Reactor Operation, Savannah River Plant, Aiken, S.C. V.I and II.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF THE HONORABLE JOE FRANK HARRIS

Office of the Governor
Atlanta, Georgia 30334

November 9, 1983

Mr. M. J. Sires, III
Assistant Manager for Health,
Safety, and Environment
Savannah River Operations Office
Post Office Box A
Aiken, South Carolina 29801

Dear Mr. Sires:

This will acknowledge the receipt of the Draft Environmental Impact Statement DOE/EIS - 0108 D, for the L-Reactor Operation at the Savannah River Plant. We appreciate the opportunity to review the document and provide comments on this important proposed action.

As you will recall, the State of Georgia's position which was presented at the February 9, 1983 field hearing in North Augusta, South Carolina addressed three areas of importance to our State. The first issue contained in my position statement is our opposition to the bedrock storage of high level nuclear waste at the Savannah River Plant. Our concern in this area has been mitigated by the Department of Energy's assurance at that Hearing that the concept has been dismissed and will not be reactivated again in the future.

FF-1 The second issue contained in our position statement is the recommendation that the Department of Energy should identify and submit for public review the cumulative effects of all the present and proposed facilities at the Savannah River Plant including the contiguous commercial operations. In reviewing the Draft Environmental Impact Statement for the L-Reactor we note that Section 5.2, entitled "Cumulative Impacts," is presented. However, the substantive information contained therein is insufficient to project the total combined environmental contamination levels during and after operational periods.

The cumulative radiological effects of all nuclear facilities expected to be operating within an 80-kilometer radius of L-Reactor are presented in Section 5.2.6 of the EIS. This analysis includes a tabulation of offsite doses (Table 5-19 of the draft EIS) and expected offsite concentrations of radionuclides in air, milk, and water (Table 5-20 of the draft EIS). Source terms for L-Reactor and associated support facilities are given in the EIS. Source terms for other nuclear facilities are not listed in the EIS to avoid overburdening

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	(See attached comments.) Therefore, this section needs to be strengthened in the final document to provide an adequate assessment of contaminant levels.	the average reader with details but are provided in the following documents: o Savannah River Plant - Average of 1978, 1979, and 1980 releases published in the Annual SRP Environmental Monitoring Reports, i.e., DPSPU-79-30-1, DPSPU-80-30-1, and DPSPU-81-30-1. o Fuel Materials Facility-SRP - Environmental Assessment, Naval Reactor Fuel Materials Facility, U.S. Department of Energy, DOE/EA-0170 (1982). o Defense Waste Processing Facility-SRP - Environmental Impact Statement - Defense Waste Processing Facility - Savannah River Plant, U.S. Department of Energy, DOE/EIS-0082 (1982). o Vogtle Nuclear Power Plant - Final Environmental Statement - Alvin W. Vogtle Nuclear Plant, U.S. Atomic Energy Commission (1974).
FF-2	A third area discussed in our February 9, 1983 position statement relates to the thermal aspects of the discharge from the L-Reactor.	Section 4.4.2 of the EIS, which discusses cooling-water mitigation alternatives, has been revised based on public comments received on the draft EIS. Specifically, Section 4.4.2 has been revised to provide a detailed discussion of additional combinations of various cooling-water systems. In Section 4.4.2, each of the cooling-water mitigation systems is evaluated for attaining the thermal discharge limits of the State of South Carolina. Section 4.4.2 and a revised Appendix I, Floodplain/Wetland Assessment, discuss the wetland impacts of each of the systems considered. The Department of Energy has been reviewing and evaluating alternative cooling-water systems for L-Reactor. Based on these reviews and evaluations, and consultations with representatives of the State of South Carolina regarding a mutually agreed upon compliance approach, a preferred cooling-water mitigation alternative is identified in this EIS. This preferred cooling-water alternative is to construct a 1000-acre lake before L-Reactor resumes operation, to redesign the reactor outfall, and to operate L-Reactor in a way that assures a balanced biological community in the lake. The Record of Decision prepared by the Department on this EIS will state the cooling-water mitigation measures that will be taken which will allow L-Reactor operation to be in compliance with the conditions of an NPDES permit to be issued by the State of South Carolina.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FF-3	We continue to view this as a matter between the State of South Carolina and the Department of Energy. Georgia will continue to support South Carolina's efforts to ensure protection of valuable groundwater resources of the region. We urge the Department of Energy to move forward expeditiously with the various studies, including groundwater contamination, that have been agreed to with South Carolina.	As noted in the opening remarks to the public hearings on the L-Reactor EIS, the DOE is committed to (1) an expanded program of sitewide ground-water monitoring and study; (2) the involvement of the State of South Carolina in onsite and offsite ground-water monitoring activities; and (3) mitigative actions at SRP to reduce pollutants released to the ground water and to establish with the State of South Carolina a mutually agreed-on compliance schedule. Current plans call for discontinuing the use of the M-Area seepage basin before April 1985 and constructing a process wastewater-treatment facility (Section 5.1.1.2.). The phaseout of the seepage basins in F- and M-Areas is planned for late 1988; the phaseout of the low-level waste burial ground is planned in the late 1990s. The "SRP Ground-Water Protection Implemention Plan" was recently developed to examine strategies and schedules to implement mitigative actions required to protect the quality of the ground waters beneath SRP. Implementation of mitigative actions would be accomplished under DOE's Resource Conservation and Recovery Act requirements, and would be compatible with the State of South Carolina's hazardous-waste management regulations. This action plan will be the subject of a separate NEPA review (Section F.6). The State of South Carolina and Federal agencies are reviewing plans for impeding the growth of the contaminant plume and the removal of the chlorinated hydrocarbons using a combination of recovery wells, a large air stripper, and injection wells and/or a spray irrigation system. A pilot air stripper is currently operating in M-Area. In addition, the health of onsite personnel will be protected by changes in the water distribution system, which will obtain potable water only from the A-Area Tuscaloosa wells, which are unlikely to receive contamination from Tertiary aquifers.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	In conclusion, please be assured that we intend to continue working with the Department of Energy staff in a cooperative manner to ensure adequate protection of our environmental resources. In moving forward to accomplish this objective, we look forward to the inclusion of a thorough and more detailed cumulative effects section in the Final Environmental Impact Statement. With kindest regards, I remain, Sincerely, Joe Frank Harris	

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	STATE OF GEORGIA'S REVIEW COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS) FOR THE L-REACTOR OPERATION	
FF-4	1. In Section 5.2, "Cumulative Impacts", radiological source terms (release rates in Curies per year) are not presented for any of the facilities listed. The absence of release rate information prevents thorough technical review of this Section.	See the response to comment FF-1.
FF-5	2. The incremental radiological release data presented in Tables 4-10, 4-11, 5-7, 5-8, 5-9, and 5-10 for L-Reactor and support operations appear to be inconsistent in several cases with earlier release data presented in the SRP Annual Reports. For example, Tables 4-11, 5-7, and 5-9 show incremental Co-60 releases to surface streams of 7.8×10^{-2} Curies while Table 42 of the 1982 SRP Annual Report (DPSPU 83-30-1) shows that the total Co-60 release from the entire SRP operation was 1.1×10^{-4} Curies in 1982.	Cobalt-60 releases to streams were based on 1978, 1979, and 1980 operating experiences, adjusted to reflect the planned mode of operation in L-Reactor. Releases of radiocobalt in 1979 were higher than average for SRP (0.41 curie) and dominate the average for the 3-year period. Releases in both 1981 and 1982 were below the 3-year average.
FF-6	3. Section 5.2, "Cumulative Impacts", does not address the discharge of non-radioactive wastes to the environment, yet Table 5-1 presents incremental non-radioactive releases to on-site seepage basins. It is difficult to assess this incremental information on its own merit. The release of non-radioactive wastes from current SRP operations should be addressed in this Section. Also, the Summary (page S-5) states that use of the M-Area seepage basin will be discontinued by March 1985. Information should be presented in the final EIS for the projected disposal of chemical and radiological wastes after that date.	Incremental releases of non-radioactive releases to the environment as the result of operation of SRP facilities supporting L-Reactor are discussed in Section 5.1.1.2. All non-radioactive discharges from SRP will meet the conditions set forth in an NPDES permit issued by the State of South Carolina. Closure of the M-Area seepage basin by April 1985 is discussed in Sections 5.1.1.2 and 5.1.1.4. As noted in Section 5.1.1.2, process wastewater from M-Area will, after treatment, be released to surface waters in accordance with the limits of an NPDES permit. DOE plans to conduct a separate NEPA review of the ground-water protection program and thermal mitigation of currently operating reactors (K and C). Additional information on the NEPA review of the "SRP Ground-Water Protection Implementation Plan" is provided in Section F.6 of the FEIS.
FF-7	4. In Table 2-2, the DEIS states that about 80,000 Curies of radioactivity, primarily tritium, will be released annually to the atmosphere from L-Reactor. This figure does not account for the incremental increase in discharges from L-Reactor support operations. For example, the total radioactive release for tritium (H-3), Kr-85, and Ar-41 from current operations,	Table 2-2 of the darft EIS lists releases to the atmosphere only from L-Reactor. Atmospheric releases from support operations are listed in Table 5-10 of the draft EIS. It is true that the total amount of H-3, Ar-41, and Kr-85 expected to be released from L-Reactor plus support operations will be about 280,000 curies. The total of these three radionuclides for

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	not including the L-Reactor, to the atmosphere is about 1,000,000 Curies per year. With the addition of the L-Reactor and incremental support operations the total release of radioactivity for these same three radionuclides will increase to 1,280,000 Curies per year.	current SRP operations (average of 1978, 1979, and 1980) was approximately 900,000 Ci, for an overall total from SRP of about 1,170,000 Ci.
FF-8	5. Several of the radionuclides, presented in Tables 4-11 and 5-8, which are discharged into seepage basins in liquid form are volatile. No information is presented in the DEIS concerning the atmospheric release of radionuclides such as iodine from the seepage basins.	Of the radionuclides released to seepage basins (Tables 4-11 and 5-8 of the draft EIS), only tritium and I-131 are normally volatile. The evaporation of tritium oxide to the atmosphere is accounted for in the EIS. Since very small amounts of I-131 are to be discharged to seepage basins, volatilization of a small fraction was not accounted for because of its insignificant contribution to offsite dose.
FF-9	6. In Section 3.7.1.2, the DEIS states that recent on-site monitoring showed Cs-137 levels in soil up to 53 millicuries per square kilometer. Table 13 of the 1982 SRP Annual Report shows Cs-137 levels on SRP property of up to 109 m Ci/km^2 compared to a background level at 100 miles radius of 36 mCi/km^2. This report also shows Pu-238 and Pu-239 levels on SRP property which are significantly higher than background levels. The final EIS should contain a discussion of the impact the L-Reactor and support operations will have on these levels in soil. The effects of long-term deposition and rainwater washoff of these materials need to be discussed.	Doses related to airborne radioactive releases from L-Reactor and its support facilities are described in the EIS, as is the remobilization of cesium-137 and cobalt-60 in Steel Creek. L-Reactor lies in the Steel Creek watershed. Washoff of radionuclides, which may exist in L-Area and the Steel Creek watershed as a whole, has resulted in very minor cesium-137 transport, typically less than 0.25 curie per year including cesium-137 remobilized in Steel Creek. This release would result in a dose to the hypothetical maximally exposed individual of less than 0.2 millirem per year. Levels for fallout radioactivity are measured annually in soil from onsite and offsite. Fallout concentration measurements vary from year to year because samples are not obtained from the exact same location each year and because of the inhomogenous nature of the soils. Table 14 of the 1982 SRP environmental monitoring report (a summary of 10 years of soil analysis data) shows the extent of this variability. Section 3.7.1.2 of the EIS will be changed to show that the average of onsite Cs-137 deposition (1976-1982) is 50 millicuries per square kilometer. The average deposition offsite was 48 millicuries per square kilometer during this same period. The years 1976-1982 were selected to calculate the average because the data for this period all represent analyses of 5-cm depth soil cores. Cs-137 of onsite soils is not expected to differ significantly from offsite soils because only about 2.5 curies

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
		have been released to the atmosphere from SRP since startup and would not be a measurable increase above the estimated deposition of about 80 curies from weapons test fallout on the plant site (104 millicuries fallout per square kilometer). On the other hand, Pu-238 and Pu-239 levels on the SRP site are higher than offsite as shown in Tables 13 and 14 of the 1982 site report. This is to be expected because the 0.7 curie of Pu-238 and 3.0 curies of Pu-239 released since plant startup is larger than the estimated deposition of about 1.6 curies of weapons test Pu-239, 240 fallout per square kilometer. Most of the plutonium releases at SRP occurred prior to 1970. Releases to the atmosphere in recent years have made an insignificant contribution to either the onsite or offsite soil inventory. Likewise, the operation of L-Reactor and support operations will have an insignificant effect on levels of these radionuclides in soil. The effect of rainwater washoff of radionuclides deposited from weapons test fallout and prior SRP releases is not an effect of the proposed restart of L-Reactor and is beyond the scope of the EIS. Measurements of environmental Cs-137, Pu-238, and Pu-239 are reported in the annual SRP environmental monitoring report.
FF-10	7. No monitoring data are presented to support the assessment of individual and population doses due to the commercial harvest of fish and shellfish (Section 5.2, Appendix B). Due to the long life-span of such fish as American Shad and Striped Bass, as well as their positions in the food chain, DOE needs to make a commitment in the final EIS to initiate a sampling program to determine the levels of radionuclides and other potentially toxic chemicals in these fish.	The comprehensive monitoring programs for SRP are summarized in Chapter 6 of the EIS and in the publicly available annual monitoring report Environmental Monitoring in the Vicinity of the Savannah River Plant. DOE has initiated a program to obtain commercially important fish and shellfish for radiological analyses.
FF-11	8. In the discussion of the "Radiation Environment" (Section 3.7) several data concerning the average annual whole body doses due to fallout (external exposure, inhalation, ingestion of food and water) are presented. The final EIS should also present the concentrations of radionuclides in the environment leading to these exposures. (mCi/km^2 deposition for external radiation, Ci/m^3 in air for inhalation dose, pCi/g in food products, and pCi/l for water and milk).	Information on the dose to individuals from weapons test fallout (Section 3.7) was included in the EIS to help characterize the radiation environment in the vicinity of the Savannah River Plant. Doses given for fallout are typical for this latitude and were obtained from the reference given [Sources and Effects of Ionizing Radiation, United Nations Scientific Committee on the Effects of Atomic Radiation (1977)]. More detailed data on local fallout measurements are given in the annual SRP environmental monitoring reports. The most recent report in this series, for 1982, is DPSPU-83-30-1.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
FF-12	9. In section 5.2.4.2, the DEIS states that Plant Vogtle will *discharge blowdown water through a diffuser to the river.* This statement is incorrect. Plant Vogtle will not use a diffuser but will use a single point discharge pipe. (Georgia Power Company, Vogtle Electric Generating Plant - Operating License Stage Environmental Report (VEGP-OLSERT) Section 3.4.5). This may or may not impact the conclusion reached in the DEIS related to the interactions of the Vogtle and SRP thermal plumes.	This statement has been corrected and will not impact the conclusion concerning interrelations of the Vogtle and SRP thermal plumes.
FF-13	10. In the discussion of alternatives to the discharge of waste-water to the L-Area seepage basin, it is stated that "The values presented in Table 4-38 are only those associated with disassembly basin purge water and do not include releases from other sources such as heat exchanger leakage, process sumps, and evaporative loss from process water leaks." The values presented in Table 4-38 are identical to the values presented in Table 4-11 for liquid releases to the L-Area seepage basin due to all L-Reactor operations. Is one then to assume that all liquid releases other than disassembly basin purges will be direct to Steel Creek? If this is not the case, then the other releases to the seepage basin should be factored into the release calculations. If it is the case, it should be clarified that all liquid releases other than disassembly basin purges discharge directly to Steel Creek.	As noted in the first paragraph of Section 4.1.2.2 of the draft EIS, radioactive materials will be discharged in liquid effluents from L-Reactor to Steel Creek during normal operation of the reactor. Sources of these discharges include small process leaks into the cooling water discharge and releases to the process sewer. Only disassembly basin purge water is discharged to the seepage basin. The doses presented in Section 4.1.2 include these sources as well as radionuclides reaching the creek via a ground-water path from the L-Reactor seepage basin. Table 4-38 of the draft EIS repeats information contained in *Table 4-11 to provide a ready reference in Section 4.4.3 to the* radiological source term associated with the L-Area seepage basin.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses

STATEMENT OF THE HONORABLE RICHARD L. OTTINGER

U.S. HOUSE OF REPRESENTATIVES
SUBCOMMITTEE ON ENERGY CONSERVATION
AND POWER
OF THE
COMMITTEE ON ENERGY AND COMMERCE
WASHINGTON, D.C. 20515

November 14, 1983

The Honorable Donald P. Hodel
Secretary
Department of Energy
Forrestal Building
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Re: Comments on the Department of Energy Draft Environmental Impact Statement on L-Reactor Operation, Savannah River Plant (DOE/EIS-0108D)

Dear Mr. Secretary:

My comments will be confined to the issue of assurance of the safety of the proposed reactor operation, raised by DOE's departure from its established, long-standing policy to operate its nuclear facilities in conformance with applicable regulations for commercial nuclear facilities.

FG-1 The operations of nuclear facilities for defense purposes are not regulated by the laws or regulations which apply to commercial nuclear facilities, or the workers' health and safety protections of the Occupational Safety and Health Administration. This exception for defense-related nuclear facilities is granted because these facilities are owned by the U.S. government, through the Department of Energy, and because the Department, and its predecessors, have had a long-standing commitment to operate its nuclear facilities in conformance with applicable environmental and safety regulations for commercial

The restart of L-Reactor will be in compliance with all applicable Federal and state environmental protection regulations. As noted in the comment, L-Reactor is excluded from NRC licensing requirements in accordance with Section 110(a) of the Atomic Energy Act, as amended. DOE is responsible for regulating the health and safety programs for its facilities. The radiation protection standards of DOE are comparable to those established by the NRC (10 CFR 20) for a production facility (i.e., 500 millirem to the whole-body in any one calendar year). In addition, like the requirements of NRC, the engineered safety features of SRP reactors are based on the need to limit potential radiological consequences in the event of an accident.

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	nuclear facilities. This arrangement has proven to be useful in meeting the needs of all concerned. National security information is guarded, public health and safety is assured to approximately the same level of risk from commercial reactors, and operational information useful to both the Nuclear Regulatory Commission and the Department of Energy can be easily exchanged. In my view, the continued commitment of the Department to the policy of conformance to the spirit, if not the letter, of commercial regulation, is vital to the continuation of this policy and in this instance, to health and safety of the people of South Carolina.	
FG-2	To date, the Department has had a relatively successful nuclear program. However, now when the commercial nuclear industry is attempting to recover from the Three Mile Island accident and indictments, and the widespread concern over quality assurances, it is not the time to depart, or appear to depart from the Department's commitment to safe operation of its nuclear facilities. In this context, it is difficult to conceive of the Commission sanctioning the operation of a 2350 MWT reactor (DEIS, Vol. 1, p. 2-14) in the absence of a containment or confinement system as an independent and final barrier to the release of airborne radioactivity in the event of a severe accident. Regulations adopted in 1962, applicable to both commercial and defense-related facilities regarding site suitability and reference dose values, require the identification of three tables (10 CFR 100). The first establishes the "source term", or the amount and composition of radioactivity which may be released in a severe accident; the second is meteorologic data and site configuration to determine atmospheric dispersal; and the third would establish the prospective dose which could be absorbed by an individual at the site boundary.	DOE has not departed from its prior commitment to safe operation of its nuclear facilities. L-Reactor is equipped with a confinement system which, coupled with the large plant site, effectively mitigates the consequences of all credible reactor accidents. The confinement system filters all air leaving the reactor building; it traps particulates and radioiodine in the event of an accident. Although noble gases and tritium would not be trapped, the offsite radiation doses would be within the dose guidelines(10 CFR 20 if it were to apply). The dose would represent a very low risk to the public health and safety as a result of both the confinement system and the long distance to the plant boundary.
FG-3	Since these figures, particularly the source term, are the basis for the safety evaluation of the reactor, it is particularly important to clearly establish how these figures were selected and justified. Of great concern to me is the statement that "no mechanisms have been identified that will cause a reactor accident resulting in core damage (fuel melt) greater than 3 percent." (DEIS, Appendix G, p. 3) This assumption is	The source term used for evaluation of the L-Reactor confinement system was established in accordance with the requirements of 10 CFR 100. This requirement of the NRC does not assume or require that the source term be based upon the assumption of a full-core meltdown; instead, 10 CFR 100 clearly states that the source term be based on an accident that "would result in potential hazards not exceeded by those from any accident

Table M-2. DOE responses to comments on Draft EIS (continued)

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	crucial to finding that only small amounts of radiation could be released, and therefore, to DOE's assertion that additional containment or confinement technology is not needed, since it would provide only a small increment of containment.	considered credible." The 3-percent core-melt accident was selected as the appropriate accident for comparison to 10 CFR 100 dose criteria because it is a major accident, postulated from the consideration of known possible accident events, that would result in potential hazards not exceeded by the hazards of any other accident considered to be credible. The statement quoted from page G-3 of the DEIS is incorrect. The statement has been corrected in this final EIS to read "No credible accident sequences have been identified that will cause a reactor accident resulting in core damage greater than 3 percent." Accident sequences that potentially could result in more than 3-percent core melting have been identified; however, such sequences have been judged to not be credible initiators based upon over a 100 years of SRP reactor operation and over 30 years of research and development specific to the safety of SRP reactors.
FG-4	This assumption is a radical departure for DOE. In the past, for other Savannah River heavy water production reactors, and even for the Clinch River Breeder Reactor, DOE has utilized the usual source term for light water reactors--based on an assumption of 100 percent core damage. (Memorandum from W.S. Durant to E.C. Nelson, "Proposed Containment Shell for Building 105-C," Tech. Div. Savannah River Laboratory (SRL), DPST-64-423, Jan. 29, 1965; Roger E. Cooper and Bernard C. Rusche, "The SRL Meteorological Program and Off-Site Dose Calculations," SRL, DP-1163, Sept. 1968; Memorandum from S.P. Tinnes to G.F. Merz, "Airborne Activity Confinement System Base Case Design Basis Accident," Tech. Div. SRL, DPST-79-441, July 19, 1979; "Site Suitability Report in the Matter of Clinch River Breeder Reactor Plant," NUREG-0786, June 1982, p. III-8.) A full discussion of the explanation and justification for this radical departure from usual DOE practice is necessary in the DEIS. I am aware of the research programs underway to reevaluate the source term at the NRC, but as yet it is my understanding that these studies have not indicated the need for revision.	The use of a 3-percent core-melt accident for assessing the adequacy of the confinement system relative to 10 CFR 100, is not a departure from past practice, but it is consistent with past practices. It is also consistent with respect to the requirements of NEPA in not including the impacts of speculative information or potential impacts with an extremely low probability of occurrence.

Table M-2. DOE responses to comments on Draft EIS (continued)

Comment number	Comments	Responses
	Such a discussion of the selection of a new source term is a necessary prerequisite to evaluating the conclusion that additional containment is not necessary, or that the national security needs for additional plutonium and tritium production are sufficient to overcome the need for new containment or confinement technology due to time constraints.	
FG-5	Alternative materials production options identified in the DEIS appear to be sufficient to provide needed materials pending the 36 months necessary for the addition of a containment or confinement mechanism from the options identified in Table 4-31. (See testimony of Dr. Thomas B. Cochran, at DOE Public Hearings, November 3, 1983.) The five month schedule advance achieved by the Purex processing facility at the Hanford site occurred after the preparation of the DEIS. This advance contributes nearly one-half of the amount of materials expected to be needed but not produced if the L-Reactor restart were delayed the 36 months required for containment/confinement installment. In summary the DEIS is defective in that it inadequately addresses or justifies a radical departure from estimates of a maximum credible accident and source term description. This unjustified departure leads DOE to the as yet unwarranted assumptions regarding the need for radionuclide containment or confinement technologies. Finally, if DOE were to find that additional containment or confinement technologies are required, sufficient options have been identified in the DEIS or are available due to the five month schedule advance for start-up of the Purex facility that has been achieved that national security needs could still be met. The DEIS should be revised to address these concerns. Sincerely, Richard L. Ottinger Chairman	Alternative material production options are not sufficient to provide needed nuclear weapon materials. Specific response to the suggestions of Dr. Cochran, including the impact of the early restart of the PUREX facility and the viability of delaying restart of L-Reactor, are contained in this appendix for comment letter "BL."